

# III-NITRIDE LIGHT-EMITTING DEVICE WITH INCREASED LIGHT GENERATING CAPABILITY

Michael R. Krames

Daniel A. Steigerwald

Fred A. Kish Jr.

Pradeep Rajkomar

Jonathan J. Wierer Jr.

Tun S. Tan

## ABSTRACT OF THE DISCLOSURE

The present invention is an inverted III-nitride light-emitting device (LED) with enhanced total light generating capability. A large area device has an n-electrode that interposes the p-electrode metallization to provide low series resistance. The p-electrode metallization is opaque, highly reflective, and provides excellent current spreading. The p-electrode at the peak emission wavelength of the LED active region absorbs less than 25% of incident light per pass. A submount may be used to provide electrical and thermal connection between the LED die and the package. The submount material may be Si to provide electronic functionality such as voltage-compliance limiting operation. The entire device, including the LED-submount interface, is designed for low thermal resistance to allow for high current density operation. Finally, the device may include a high-refractive-index ( $n > 1.8$ ) superstrate.